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HOTBEDS

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HOTBEDS

Definition

A hotbed is a plot of earth enclosed in a low frame, covered with glass or cloth, heated usually by fermenting manure. If the heat is omitted it is called a cold frame.

Uses and Advantages

Its principal use is for furnishing the proper temperature for the developing of plants out of their regular season of growth. This is known as "**forcing**". There are two types of forcing: One where plants are started in the hotbed and then transplanted to the open ground or to the cold frame; the other where they are grown to maturity under the glass. In summer after the glass tops are removed the bed may be used for growing various crops, such as melons, cucumbers and tender flowers.

Plants That Can Be Grown in the Hotbed

1. Those that can be grown to market size: Lettuce, radishes, onions, beans and spinach.
2. Those that can be grown for removal to open ground: Cabbage, squash, eggplant, cucumbers, melons, parsnips, sweet potatoes, tomatoes, peppers and celery.

Construction

There are numerous types of hotbeds, but the simplest and cheapest is the one used by almost all commercial growers and farmers. A convenient size of hotbed is 6 by 12 feet. This requires four sash of the normal size, 6 by 3 feet, or three sash 6 by 4 feet. The frame should extend 12 to 15 inches above ground at the back and 8 to 11 inches at the front. Spruce, pitch pine and cypress woods are the best



Figure 1.—Section of a hotbed being used for growing sweet potato plants. The cross-bars with the middle projection; the height of the backboard, and sash slid down for ventilation, are shown in this illustration.

to be used in the construction, but almost any sort may be used successfully.

A simple frame may be constructed as follows: The frame must be 12 feet 3 inches long inside, and about one inch less than six feet wide outside. A 14-inch board should be used for the back and an 8 inch one for the front. The ends must be cut to correspond to the slope. Every three feet a crossbar should be placed for the sash to rest on. These should be about two inches broad and should have a one-half-inch strip projecting from the middle to prevent the sash coming together and binding. About one-fourth inch should be allowed on each side of this strip so that the sash will slide easily even when swollen by moisture. The sides and ends can be nailed together, but if bolted or mortised they can be taken apart and stored much more easily. Two-inch planks are much better for making this frame than one-inch boards. After the frame is made it should be given two coats of paint to prevent weathering and rotting. The pit for this frame should be a foot longer each way so that the edges of the bed will get a uniform temperature. The length of the frame described above may be modified to comply with the requirements of each user.

Sash

The sash may be bought glazed or unglazed. It is cheaper to buy them unglazed and glaze them at home, if it is possible to do so. Cypress and cedar make the best sash. They vary in thickness—1 $\frac{7}{8}$ inches and 1 $\frac{3}{8}$ inches being the most common. The latter are lighter to handle, but are damaged more frequently by wind. When purchasing the sash, one should always insist that the joints be leaded before the parts are put together. Single and double strength glass are used in the sash, the double strength glass being usually considered the best. Sash are also occasionally made with double glass. These double glass sash are heavy to handle; expensive; not very durable, due to accumulation of moisture between the two layers of glass, and accumulate dirt, and thus reduce the amount of light admitted to the bed. All sash should be given two coats of paint before being used.

Other Material for Hotbed Covers

Oiled papers, waterproof cloth, and even cheap muslin may be used for a covering to a hotbed in which plants are to be started. They are sometimes better than glass for late use, as the beds do not become so hot and dry under them. A simple sash of inch strips may be made for stretching the paper or cloth, or the cloth may be nailed directly to the hotbed frame. In this southwestern country, cabbage, tomato and sweet potato plants are very frequently grown under the cheap muslin. This is the cheapest and easiest method, and the plants are always ready by the time they can be set in the open ground. Such frames are easier taken care of than those covered with glass for they are self-ventilating. Waterproof hotbed cloth may be purchased at a reasonable price.

Material for Protection of Hotbeds

For early hotbeds, cover in addition to the sash must be given. Carpet matting, old carpet and burlap make good covering material. Market gardeners frequently make mats of rye straw. Many times loose straw is piled on the frame.

Board shutters are very convenient and are indispensable during very cold weather. They should be provided for every sash. They

are made of one-half or five-eighths-inch pine boards and the same size as the sash. These may be used directly over the glass or may be placed on the mats to hold them in place and keep them dry. The shutters are necessary whenever there is hail.

Cost of a Hotbed if Bought Complete

Well mortised frame 12 by 6 feet	\$ 1.00
Four sash, good quality, glazed with double strength glass.....	12.00
Shutters and mats, paint, etc.....	4.00
Total	\$ 20.00

Cost of Above Hotbed if Labor Is Done at Home

Boards for frame	\$ 1.50
Four sash, good quality, unglazed	7.00
Double strength glass for glazing	3.00
Shutters, mats, paint, nails, etc	3.00
Total	\$ 14.50

Cost of a Cheap Hotbed

This will serve for a few years. Labor to be done at home:

1-inch boards for 12 by 6-foot frame	\$ 1.00
Four sash, 6 by 3 feet, cheap, unglazed	5.00
Single strength glass for glazing	2.00
Total	\$ 8.00

Cost of a Cheap Hotbed

With muslin sash, labor done at home:

1-inch boards for 12 by 6-foot frame	\$ 1.00
Strips and muslin for sash	1.00
Total	\$ 2.00

Placing the Hotbed

When placing a hotbed several things must be taken into consideration. It should be convenient to water and farm buildings.

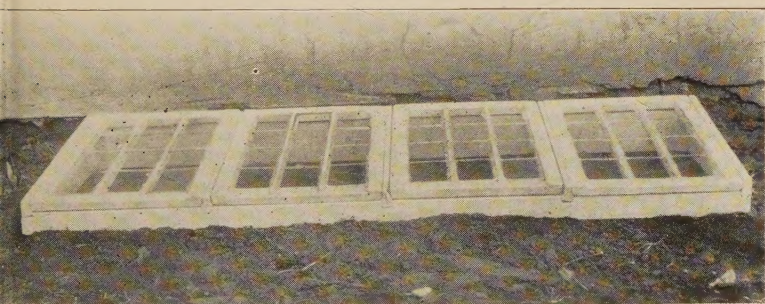


Figure 2.—A six by twelve-foot hotbed ready for use. Note that it is placed to the south of a building for protection and convenience.

When sowing or transplanting in winter a warm place is necessary in which to work. Some times it is necessary to give very close attention for a few hours, and one must have a comfortable place near in which to stay. Good protection from the north and west winds, and good drainage are also very essential. In order to fulfill the requirements most easily the bed should be placed at the south of some building. Hills or trees may be taken advantage of or prepared wind-breaks, such as board walls and hedges may be used. The exposure should be southern; that is, the sash sloping from north to south.

The Pit

The pit will vary in depth with the plants to be grown, the latitude, length of time that the hotbed is to furnish heat to a crop, time of year used, the quality of the manure used, and the skill of the operator in managing the bed. For general use in Oklahoma, fifteen to twenty-four inches should be sufficient. The following table gives the approximate depths of ordinary manure required for different temperatures:

For zero weather, at least 18 inches.

For midwinter, at least 24 inches.

For slight frost, at least 6 to 12 inches.

To hold heat for two months, at least 30 inches.

For growing plants like lettuce, a lesser depth may be used than for plants such as eggplant, pepper and tomato.

The pit should be dug in the fall and a few inches of leaves or coarse manure placed in it during the winter.

Time to Start Hotbeds

Hotbeds may be used any time during the winter for forcing lettuce or radishes. For plants that are to be removed to the cold frame or to the open ground, the time for starting the hotbed in which the plants are to be grown must be calculated. The plants which are usually started in hotbeds are either tender, such as tomato, pepper, sweet potato, etc., or more or less hardy as cabbage, lettuce, etc. The time for starting the hotbed will depend upon the kind of plant to be grown, and the treatment before being set out in the open ground. Semi-hardy plants, such as cabbage, may be planted in the hotbed six or seven weeks before the time for going into the open ground. While in the hotbed they should have plenty of room and be subjected to a cool temperature the last three or four weeks in order to "harden them off". Such plants may be put out in the open ground about the middle of March to the first of April, which means that the seed should be planted in the hotbed some time from the first to the middle of February. Tomatoes, peppers and other tender plants will also remain in the hotbed six to seven weeks, if given plenty of room and ventilation. It is not safe to put such plants in the open ground here before the latter part of April or first of May. From this it will be seen that these plants should be started in the hotbed about the first to the fifteenth of March. Where cold frames are used in connection with hotbeds, in which to transplant the seedlings before setting in the open ground, the hotbed may be started earlier. In this case the rows in the hotbed may be as close as three or four inches, and the seed thick in the rows. Where the planting is thin the seedlings will stand in the hotbeds four weeks, approximately, before being transplanted to the cold frame.

Preparation of the Manure

Any kind of manure may be used for heating, but practically all hotbeds are heated with horse manure. It seems to give the best

atisfaction. The manure should be uniform in composition and texture, preferably from grain-fed horses, and must be of practically the same age. That secured from livery stables generally gives good results. The pure manure as it comes from the stable is too dense and heats too rapidly, sometimes even burning. Litter or well rotted leaves should be added, 1 part of litter or leaves to 2 parts of manure. The preparation of the manure should begin ten to fifteen days before the time that the beds are wanted for seed sowing. An excellent way to prepare it under shelter; pile in a shallow pile, and allow fermentation to start. It should be moist, but not wet. If it is dry it must be moistened thoroughly with water, preferably hot water, but this is not always possible. When it is wet, it will remain cold until it starts to dry out. Adding a little hen manure may sometimes start the heating. The manure generally heats in spots at first, and for this reason should be turned a few times and all the hard lumps broken up. Manure with the proper amount of litter will give a springy feeling to the feet as one walks over it, but will not fluff up when pressure is removed, nor will it pack into a soggy mass. When it is steaming uniformly it is fit to be put into the pit.

Filling the Pit

It is desirable, first, to put in a couple of inches of straw or litter to keep the manure from the cold earth. Then the manure should be worked in, spread evenly, and packed down with the fork. The corners must be well filled. After the manure has warmed up it should be stamped thoroughly, especially along the sides and in the corners. As the manure will settle an inch or two, allowance must be made for this. An inch of straw is next desirable to aid in distributing the heat more evenly. Next, from six to eight inches of good hotbed soil must be placed in the pit. If flats are to be used, two inches of soil is sufficient. A flat is a box 12 by 18 inches and 4 inches deep, used for starting seedlings. This soil should contain a large percent of sand and humus. A mixture of two-thirds decomposed pasture sods and one-third rotten manure is excellent for hotbed soil. Another good hotbed soil is composed as follows: One part sand, 1 part decayed leaves, 1 part well rotted manure, 1 part good garden soil. If neither of these is obtainable, a rich, loamy garden soil may be used. Now the bed should be raked smooth and leveled and the sash placed in position. Banking from three to six inches high on the outside will help the bed to retain its heat. This may be done with either manure or earth.

Planting

At first the temperature of the soil will rise very high. At the end of two or three days, or when it drops back to 80° or 90° Fahrenheit, it is time to begin to sow the seed. A thermometer is very convenient and almost necessary for determining these temperatures. A regular soil thermometer should be used as it will not break easily.

Before planting, the soil should be loosened thoroughly. This will kill all the weed seedlings that have germinated. If the plants are to be transplanted the rows should be three to four inches apart and the seeds one-fourth to one-half inch apart in the row. If the plants are not to be transplanted before being set in their permanent places, the rows should be four to six inches apart and the seeds one to two inches apart in the rows. The seeds should be planted at an average depth of one-fourth inch. Furrows may be made by pressing the edge of a board into the soil. After sowing the seeds in the rows, they must be covered with soil and pressed down, preferably with a flat board. The bed should then be watered with a fine spray

nozzle or rose. Such plants as will not transplant easily should be grown in flats, berry boxes or paper pots.

Care and Management

The watering should be done during sunny mornings, so that the plants will dry before night. To remain wet for any length of time is

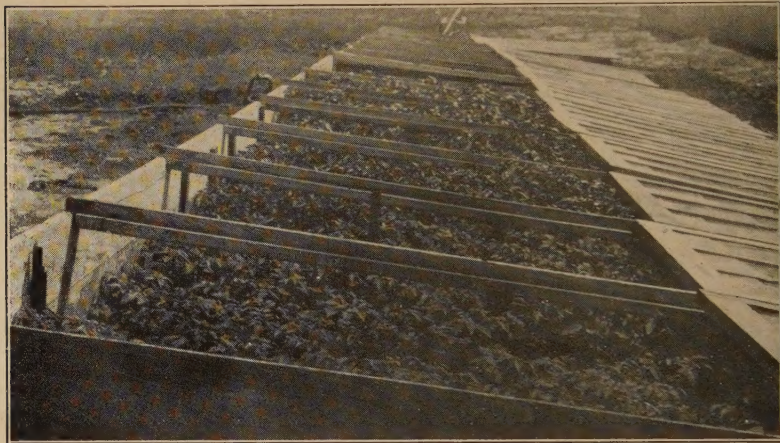


Figure 3.—A 6 by 48-foot hotbed containing tomato plants ready for the open ground. Note method of ventilating, the convenient water supply, and method of construction.

very injurious to hotbed plants. The watering should be done thoroughly with a fine spray and only when the plants actually need it. Care should be taken not to puddle the soil. When the weather is cold less water should be used, as only a little ventilation can be given. The best temperature for water is from 65° to 75° Fahrenheit. The fact is, however, that no commercial grower ever thinks of heating water. He uses it just as it comes from the spigot with good results. The heat may be regulated to some extent by the watering. The hotbed must be ventilated by raising and lowering the sash. The ventilation is very important and must be watched closely. Watering may be neglected for a day or two without any very harmful results, but if one is two or three hours late every day in ventilating the bed the plants will not thrive long. Plants that are not ventilated much grow tall and soft, and not stocky as they should grow to be of value. This is the main means of regulating the temperature. The temperature should not be allowed to go above 75° in the day nor below 50° at night. Whenever moisture condenses on the glass more ventilation should be given if possible. The sash may be held up by using notched blocks. No direct wind should enter the bed. The sash can be raised away from the prevailing wind or the sash may be slid down for a few inches.

When the plants are to be transplanted before being set in their permanent places, it should be done when the third leaf appears. They should then be set in rows from four to five inches apart and three to three and one-half inches apart in the row. Lettuce will mature in a space seven inches square and should be set in this manner in the bed. The top of the soil in the bed should be loosened frequently.

In the fall the pits should be cleaned and filled with litter. The sash and frames should be painted and stored.